# Nuclear Sustainability Teaching Task

# Information Sheet for Teaching Task

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| Module title: | Nuclear Sustainability |
| Module description (overview): | In this Project Based Learning unit, students are asked to answer the question, “Is nuclear energy sustainable?” First, students are introduced to their task through an entry event in which they are given a brief introduction to the nuclear energy controversy and are told they will be writing an Op-Ed arguing for or against nuclear power based on their knowledge of the atom, nuclear chemistry, and nuclear power. They are also tasked with creating a public service announcement to persuade others of their views. After identifying what they know and want to learn about nuclear chemistry and nuclear power, they research the topics, complete labs/ activities about atomic structure, read a number of different opinion pieces, and hear a presentation from an activist. They work collaboratively in groups for much of the process. Then they write the Op-Ed (individually) and complete public service announcement (in groups). The project concludes with presentations of their editorials and public service announcements to the class and community activists. |
| Template task (include number, type, level): | Task 2: Argumentation/Analysis, L1, 2, 3  [Insert question] After reading \_\_\_\_\_\_\_\_ (literature or informational texts), write a/an \_\_\_\_\_\_\_\_ (essay or substitute) that addresses the question and support your position with evidence from the text(s). L2 Be sure to acknowledge competing views. L3 Give examples from past or current events or issues to illustrate and clarify your position. |
| Teaching task: | Is nuclear energy sustainable? After reading articles and your chemistry text book, write an Op-Ed that addresses the question and support your position with evidence from the texts.  Be sure to acknowledge competing views. Give examples from past and current events or issues to illustrate and clarify your position. |
| Grade(s)/Level: | 11th Grade |
| Discipline: (e.g., ELA, science, history, other?) | Science and English |
| Course | Integrated Chemistry and English |
| Author(s): | Diana Weldon, Chemistry teacher at Tech Valley High School, Rensselaer, NY  Jennifer Hower, English teacher at Tech Valley High School, Rensselaer, NY  With assistance from Alix Horton, Literacy Coach at New Tech Network, Napa, CA |
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**Section 1: What Task?**

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| Background to share with students: | With Japan’s nuclear crisis in the wake of an earthquake and tsunami, a growing amount of nuclear waste, as well as ever rising oil prices and the need for clean energy, people all over the world are asking: is nuclear energy sustainable? Is it worth the price? With this project, you will be answering that question.  Entry Event    Image from “Sustainable Energy Choices for the 21st Century” (YouTube video) at <http://www.youtube.com/watch?v=98frSed0F5s>  Make sure you have your KWLS (**K**now- **W**ant to learn- **L**earned- **S**till need to learn) chart! Keeping the question “is nuclear energy sustainable?” in mind, review the following resources and update your chart. We will be discussing this as a group, so be ready to share!  **YouTube videos**  <http://youtu.be/GmWadizC8AQ>  <http://www.youtube.com/watch?v=98frSed0F5s>    **Articles (pick one)**  <http://www.nytimes.com/roomfordebate/2011/03/13/japans-nuclear-crisis-lessons-for-the-us/the-price-of-fission-power>  <http://www.csmonitor.com/USA/2011/0315/Meltdown-101-What-are-spent-fuel-pools-and-why-are-they-a-threat>  <http://news.discovery.com/tech/is-nuclear-energy-safe.html>  <http://www.lbl.gov/abc/Basic.html>  <http://science.howstuffworks.com/nuclear-bomb2.htm>  **And be sure to look at the RUBRIC!** |
| Teaching task: | **Is nuclear energy sustainable? After reading articles and your chemistry text book, write an Op-Ed that addresses the question and support your position with evidence from the texts.  Be sure to acknowledge competing views. Give examples from past and current events or issues to illustrate and clarify your position.** |
| Reading texts: | * Chapter 4, chapter 5 section 1, and chapter 25 of Chemistry: Matter and Change * Michio Kaku, “Faust and Fission Power” (article) * Pete Spotts, “Meltdown 101: What Are Spent Fuel Pools, and Why Are They a Threat?” (article) * Tracy Staedter, “Is Nuclear Energy Safe?” (article) * “ABC’s of Nuclear Science” (article) * William Harris, Craig Freudenrich, and John Fuller, “How Nuclear Bombs Work” (article) * “The Great Sustainability Debates- Nuclear Energy” (article) * Citizens’ Environmental Coalition (website) * “Fukushima- It’s Much Worse Than You Think” (article) * “Chernobyl Accident 1986” (website) * Articles from research |
| Extension | In your groups, create an ad campaign for a real audience (the format and audience is your group’s choice), explaining the chemistry of nuclear energy and promoting a particular point of view regarding whether or not nuclear energy is a sustainable way to generate electricity. |

TEXTS/OTHER USED IN TEACHING TASK

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| Texts/Other | Citations | Comments |
| *Chemistry: Matter and Change* | (textbook) Glencoe/ McGraw Hill. <http://www.thisamericanlife.org/radio-archives/episode/431/see-no-evil?act=2> |  |
| “Faust and Fission Power” | Michio Kaku. *The New York Times.* (article) <http://www.nytimes.com/roomfordebate/2011/03/13/japans-nuclear-crisis-lessons-for-the-us/the-price-of-fission-power> |  |
| “Meltdown 101: What Are Spent Fuel Pools, and Why Are They a Threat?” | Pete Spotts. *The Christian Science Monitor* (article) <http://www.csmonitor.com/USA/2011/0315/Meltdown-101-What-are-spent-fuel-pools-and-why-are-they-a-threat> |  |
| “Is Nuclear Energy Safe?” | Tracy Staedter. *Discovery News* (article) <http://news.discovery.com/tech/is-nuclear-energy-safe.html> |  |
| “ABC’s of Nuclear Science” | From the Lawrence Berkeley National Laboratory. (article) <http://www.lbl.gov/abc/Basic.html> |  |
| “How Nuclear Bombs Work” | William Harris, Craig Freudenrich, and John Fuller. *How Stuff Works* (article) <http://www.howstuffworks.com/nuclear-bomb.htm> |  |
| “The Great Sustainability Debates- Nuclear Energy” | From *The Natural Edge Project*. (website) <http://www.naturaledgeproject.net/TheGreatSustainabilityDebates-NuclearPower.aspx> |  |
| “Denying the Invisible” | Act 2 of “See No Evil.” *This American Life (*radio broadcast) <http://www.thisamericanlife.org/radio-archives/episode/431/see-no-evil> | Act 2 of the *This American Life* episode focuses on Chernobyl. |
| *Into Eternity* | (YouTube movie trailer) <http://www.youtube.com/watch?v=GmWadizC8AQ&feature=youtu.be> | This is a movie trailer for a documentary on a nuclear storage facility being built in Finland. |
| “Sustainable Energy Choices for the 21st Century” | From Brave New Climate. (YouTube video) <http://www.youtube.com/watch?v=98frSed0F5s> | Brave New Climate is an organization dedicated to promoting nuclear energy. |
| “Does the World Need Nuclear Energy?” | *TED Talk* (video). <http://www.ted.com/talks/debate_does_the_world_need_nuclear_energy.html> |  |
| “Chernobyl Accident 1986” | From the World Nuclear Association. (website) <http://www.world-nuclear.org/info/chernobyl/inf07.html> |  |
| “Fukushima- It’s Much Worse Than You Think” | Dahr Jamail. *Aljazeera* English language web service. (article)  <http://www.aljazeera.com/indepth/features/2011/06/201161664828302638.html> |  |
| Citizens’ Environmental Coalition | (website) <http://www.cectoxic.org/> | Environmental health organization website. |
| “Nuclear Safety” | Christine Dobbins of Citizens Environmental Coalition (presentation). <http://www.cectoxic.org/aboutus.html> | Christine Dobbins is a member of an environmental health organization. |
| Rutherford Scattering Simulation | Interactive simulation from the University of Colorado at Boulder. (Web) <http://phet.colorado.edu/en/simulation/rutherford-scattering> |  |
| Isotopes of “Pennium” Lab | Paul Laurence Dunbar. *Virtual Chemistry Classroom*. <http://staff.fcps.net/jswango/unit2/atomic_structure/pennium%20lab.pdf> |  |
| Half-Life of Pennyium Activity | From the Global Teacher’s Academy at the Berkeley Center for Cosmological Physics. <http://bccp.lbl.gov/Academy/pdfs/Penny_HalfLife.pdf> |  |

COMMON CORE STATE STANDARDS

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| READING STANDARDS FOR ARGUMENTATION | |
| “Built-in” Reading Standards | “When Appropriate” Reading Standards |
| 1- Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.  11th grade: Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain. | 6- Assess how point of view or purpose shapes the content and style of a text.  11th grade: Determine an author’s point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text. |
| 2- Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.  11th grade: Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text. | 7- Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.  11th grade: Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem. |
| 4- Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.  11th grade: Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the  cumulative impact of specific word choices on meaning and tone (e.g., how the  language of a court opinion differs from that of a newspaper). |  |
| 10- Read and comprehend complex literary and informational texts independently and proficiently.  11th grade: By the end of grade 11, read and comprehend literary nonfiction in the grade11 CCR text complexity band proficiently, with scaffolding as needed at the high end of the range. |  |
| WRITING STANDARDS FOR ARGUMENTATION | |
| “Built-in” Writing Standards | “When Appropriate” Writing Standards |
| 1- Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.  11th grade: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.  a. Introduce precise, knowledgeable claim(s), establish the significance of the  claim(s), distinguish the claim(s) from alternate or opposing claims, and  create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.  b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience’s knowledge level, concerns, values, and possible biases.  c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.  d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.  e. Provide a concluding statement or section that follows from and supports the argument presented. | 6- Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.  11th grade: Use technology, including the Internet, to produce, publish, and update  individual or shared writing products in response to ongoing feedback, including new arguments or information. |
| 4- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.  11th grade: same as above | 7- Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.  11th grade: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. |
| 5- Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.  11th grade: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. | 8- Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.  11th grade: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. |
| 9- Draw evidence from literary or informational texts to support analysis, reflection, and research.  11th grade: Draw evidence from literary or informational texts to support analysis, reflection, and research.  b. Apply *grades 11–12 Reading standards* to literary nonfiction |  |
| 10- Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audience.  11th grade: same as above |  |

Content Standards From State or District

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| Standards source: | New York State Science Standards; <http://www.p12.nysed.gov/ciai/mst> |
| Number | Content StandardS |
| Standard 4, Key Idea 3 | 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. 3: Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity. |

Teaching task Rubric (Argumentation)

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| Scoring Elements | Not Yet | | Approaches Expectations | | | Meets Expectations | | | Advanced | |
| 1 | 1.5 | | 2 | 2.5 | | 3 | 3.5 | | 4 |
| Focus | Attempts to address prompt, but lacks focus or is off-task. |  | | Addresses prompt appropriately and establishes a position, but focus is uneven. |  | | Addresses prompt appropriately and maintains a clear, steady focus. Provides a generally convincing position. |  | | Addresses all aspects of prompt appropriately with a consistently strong focus and convincing position. |
| Controlling Idea | Attempts to establish a claim, but lacks a clear purpose. (L2) Makes no mention of counter claims. |  | | Establishes a claim. (L2) Makes note of counter claims. |  | | Establishes a credible claim. (L2) Develops claim and counter claims fairly. |  | | Establishes and maintains a substantive and credible claim or proposal. (L2) Develops claims and counter claims fairly and thoroughly. |
| Reading/ Research | Attempts to reference reading materials to develop response, but lacks connections or relevance to the purpose of the prompt. |  | | Presents information from reading materials relevant to the purpose of the prompt with minor lapses in accuracy or completeness. |  | | Accurately presents details from reading materials relevant to the purpose of the prompt to develop argument or claim. |  | | Accurately and effectively presents important details from reading materials to develop argument or claim. |
| Development | Attempts to provide details in response to the prompt, but lacks sufficient development or relevance to the purpose of the prompt. (L3) Makes no connections or a connection that is irrelevant to argument or claim. |  | | Presents appropriate details to support and develop the focus, controlling idea, or claim, with minor lapses in the reasoning, examples, or explanations. (L3) Makes a connection with a weak or unclear relationship to argument or claim. |  | | Presents appropriate and sufficient details to support and develop the focus, controlling idea, or claim. (L3) Makes a relevant connection to clarify argument or claim. |  | | Presents thorough and detailed information to effectively support and develop the focus, controlling idea, or claim. (L3) Makes a clarifying connection(s) that illuminates argument and adds depth to reasoning. |
| Organization | Attempts to organize ideas, but lacks control of structure. |  | | Uses an appropriate organizational structure for development of reasoning and logic, with minor lapses in structure and/or coherence. |  | | Maintains an appropriate organizational structure to address specific requirements of the prompt. Structure reveals the reasoning and logic of the argument. |  | | Maintains an organizational structure that intentionally and effectively enhances the presentation of information as required by the specific prompt. Structure enhances development of the reasoning and logic of the argument. |
| Conventions | Attempts to demonstrate standard English conventions, but lacks cohesion and control of grammar, usage, and mechanics. Sources are used without citation. |  | | Demonstrates an uneven command of standard English conventions and cohesion.  Uses language and tone with some inaccurate, inappropriate, or uneven features. Inconsistently cites sources. |  | | Demonstrates a command of standard English conventions and cohesion, with few errors. Response includes language and tone appropriate to the audience, purpose, and specific requirements of the prompt. Cites sources using appropriate format with only minor errors. |  | | Demonstrates and maintains a well-developed command of standard English conventions and cohesion, with few errors. Response includes language and tone consistently appropriate to the audience, purpose, and specific requirements of the prompt. Consistently cites sources using appropriate format. |
| Content Understanding | Attempts to include disciplinary content in argument, but understanding of content is weak; content is irrelevant, inappropriate, or inaccurate. |  | | Briefly notes disciplinary content relevant to the prompt; shows basic or uneven understanding of content; minor errors in explanation. |  | | Accurately presents disciplinary content relevant to the prompt with sufficient explanations that demonstrate understanding. |  | | Integrates relevant and accurate disciplinary content with thorough explanations that demonstrate in-depth understanding. |

Extension task Rubric

**KEY**

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|  | Mastering | Demonstrates exceptional performance. The work is complete, correct, and high quality. | 85-100% |
|  | Developing | Meets the minimum criteria. The work is partially complete, partially correct, or of mediocre quality. | 65-84% |
|  | Emerging | Below performance standards. The work is missing or entirely incorrect. | 0-64% |

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| **Learning** **Outcome** | **MASTERING** **(High Performance)** |
| **Chemistry Content**  **100 points** | Your product should clearly demonstrate or explain:   * The advancement of the atomic theory including the Dalton, Thompson, Rutherford, Bohr atomic models as well as the current wave theory model.  Include key characteristics of each model. * The subatomic particles, their location within the atom, their charges, and relative mass * Atomic mass, mass number and isotopes of atoms * How fission works and includes the main types of nuclear reactions. * Which of the nuclear reaction types are dangerous and why. * What half-life is and how it is calculated * The relevance of half-life to the sustainability of nuclear power.  Use examples from your research. * Describes why some elements are radioactive and others are stable, using both a description of the nucleus and the “band of stability”. * Generally, how a nuclear reactor works to create electricity * What nuclear waste is generated and what happens to it * What can be done with the spent fuel rods. |
| **Score (%)** | 0 - - 25 - - 50 - - 60 - -65 - - 70 - - 75 - - 80 - - 85 - - 90 - - 95 - - 100 |
| **Comments** |  |
| **English Content**  **100 points** | * Cite strong and thorough textual evidence to support analysis of what the texts say explicitly as well as inferences drawn from the texts, including determining where the texts leave matters uncertain. * Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem. |
| **Score (%)** | 0 - - 25 - - 50 - - 60 - -65 - - 70 - - 75 - - 80 - - 85 - - 90 - - 95 - - 100 |
| Comments |  |
| **Communication** | * Ideas must be communicated to a real audience |
| **Score (%)** | 0 - - 25 - - 50 - - 60 - -65 - - 70 - - 75 - - 80 - - 85 - - 90 - - 95 - - 100 |
| **Comments** |  |
| **Group collaboration**  **(50 pts)**  **Individual collaboration**  **(50 pts)** | * Group’s digital folder has almost daily postings of work in progress. * Project is on time and complete. * Group communication form with amendments and task list are complete and thoughtful. * Team members share information and learning. * Group members are knowledgeable of the work of other members of that group. * Pacing chart is followed, deadlines are met * Daily action plans are developed and team members are held accountable * 2-3 weekly team meetings are held with evidence kept as a log in pacing chart. * Benchmarks are complete to the satisfaction of the group and on time |
| **Score (%)** | 0 - - 25 - - 50 - - 60 - -65 - - 70 - - 75 - - 80 - - 85 - - 90 - - 95 - - 100 |
| **Comments** |  |
| **Information Literacy**  **100 points** | * Cite all sources used in the correct format * If written text warrants, use parenthetical citations |
| **Score (%)** | 0 - - 25 - - 50 - - 60 - -65 - - 70 - - 75 - - 80 - - 85 - - 90 - - 95 - - 100 |
| **Comments** |  |

**Section 2: What Skills?**

*Content Literacy Skills*

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| **Skill** | **Definition** |
| **Preparing for the Project** |  |
| Identifying knows and need to knows | …Ability to identify what is already known and what needs to be learned and done in order to complete the task, as outlined in the entry document, background information sources, and rubrics |
| **Gathering Information** |  |
| Research skills | …Ability to evaluate and synthesize information from a variety of sources |
| Reading skills | ...Ability to draw inferences from text |
| Note-taking | …Ability to identify important information and use appropriate note-taking strategies |
| **Other Content Skills** |  |
| Atomic models | …Ability to describe the advancement of atomic models |
| Subatomic particles | …Ability to describe the kinds and characteristics of subatomic particles |
| Characteristics of atoms | …Ability to describe the characteristics of atoms, including their atomic mass, mass number, and isotopes |
| Nuclear reactions | ….Ability to describe how fission works, the main types of nuclear reactions, and which types are dangerous and why |
| Radioactivity | …Ability to explain why some elements are radioactive and others are not |
| Half-life | …Ability to define half-life, describe how it is calculated, and explain its relationship to nuclear reactors and waste |
| Nuclear reactors | …Ability to describe how a nuclear reactor works, including the waste it generates |
| **Transition to Creating Final Product/s** |  |
| Brainstorming | ...Ability to write quickly, brainstorming about an initial opinion |
| **Creating Final Product/s** |  |
| Writing an Opening | …Ability to write an introduction with a thesis |
| Development | ...Ability to use textual evidence to support argument |
| Revising and Editing | ...Ability to revise and edit for spelling, grammar, usage, format, and clarity errors |

*Learning Outcome Skills*

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| **Skill** | **Definition** |
| **Communication** |  |
| Audience | … Ability to choose and communicate to an authentic audience |
| **Information Literacy** |  |
| Avoiding plagiarism | …Ability to correctly cite sources |
| **Collaboration** |  |
| Delegation and task division | ...Ability to use various strategies to delegate and divide tasks among group members |
| Task completion | …Ability to complete tasks in a timely fashion according to pacing chart |
| Communication | …Ability to communicate effectively with team |

**Section 3: What Instruction?**

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| **Mini-task** | Group | Complete a Know/ Want to Know/ Learned/ Still Need to Know chart based on the entry document, rubrics, and background sources, listing your prior knowledge and the questions you need to answer in order to complete the project. | | |
|  | **Skill/s Assessed** | …Ability to identify what is already known and what needs to be learned and done in order to complete the task, as outlined in the entry document, background information sources, and rubrics | | |
|  | **Criteria for Success** | Knows and need to knows are clearly reflective of information in rubric, background information sources, and entry document | | |
|  |  | **Instructional Strategies** | * **K**now, **W**ant to Know, **L**earned, **S**till Need to Know chart graphic organizer * Group share and discussion of items from chart * Revisit KWLS chart periodically throughout project | |
| **Mini-task** | Individual | Read the textbook chapters on the atom and nuclear chemistry, completing Cornell notes as you do so. | | |
|  | **Skill/s Assessed** | …Ability to describe the advancement of atomic models  …Ability to describe the kinds and characteristics of subatomic particles  …Ability to describe the characteristics of atoms, including their atomic mass, mass number, and isotopes  ….Ability to describe how fission works, the main types of nuclear reactions, and which types are dangerous and why  …Ability to explain why some elements are radioactive and others are not  …Ability to define half-life, describe how it is calculated, and explain its relationship to nuclear reactors and waste  …Ability to describe how a nuclear reactor works, including the waste it generates | | |
|  | **Criteria for Success** | Cornell notes include notes in students’ own words regarding above topics, with appropriate summaries and questions. | | |
|  |  | **Instructional Strategies** (flexible, depending on students’ needs) | * Workshop on Cornell notes * Cornell notes template * “Textbook circles” or small groups meeting to discuss and reflect on reading * Workshop (small group) on atomic models * Workshop (small group) on subatomic particles | |
| **Mini-task** | Individual | Write a description of the nucleus of an atom and Rutherford’s scattering experiment that proved that atoms had a small ‘core’ | | |
|  | **Skill/s Assessed** | …Ability to describe the advancement of atomic models | | |
|  | **Criteria for Success** | Description compares and contrasts ‘plum pudding’ vs. charged nucleus theories of atom and explains how Rutherford’s experiment disproves the ‘plum pudding’ model. | | |
|  |  | **Instructional Strategies** (flexible, depending on student need) | * Rutherford Scattering Simulation for CU Boulder * Sentence frames to support academic writing | |
| **Mini-task** | Individual | Describe how the ‘pennium/ pennyium’ labs simulated the isotopes, atomic mass, and half-life of an element | | |
|  | **Skill/s Assessed** | …Ability to describe the characteristics of atoms, including their atomic mass, mass number, and isotopes  …Ability to define half-life and describe how it is calculated | | |
|  | **Criteria for Success** | Description is detailed and correctly identifies the penny ‘isotopes,’ ‘atomic mass,’ and ‘half-life’ | | |
|  |  | **Instructional Strategies** (flexible, depending on student need) | * “Isotopes of Pennium” lab * “Half-Life of Pennyium” lab * Sentence frames for scientific language | |
| **Mini-task** | Individual | Gather additional information from research and class presentations, annotating or completing Cornell notes of important evidence that supports your position as well as counterclaims against your position. | | |
|  | **Skill/s Assessed** | …Ability to evaluate and synthesize information from a variety of sources  ...Ability to draw inferences from text  …Ability to identify important information and use appropriate note-taking strategies  ...Ability to use textual evidence to support argument | | |
|  | **Criteria for Success** | Annotations and Cornell notes highlight important information from articles that could be used to support Op-Ed argument, as well as counterclaims to address | | |
|  |  | **Instructional Strategies** (flexible, depending on student need) | * Workshop on using purpose to find important information * Guided reading in small groups of “Fukushima- It’s Worse Than You Think” and “Chernobyl Accident- 1986” * Cornell notes from presentation by representative from Citizens’ Environmental Coalition, with group debrief | |
| **Mini-task** | Individual | Brainstorm for and write a rough draft of your Op-Ed on nuclear sustainability that has an introduction with a thesis, evidence, and citations. | | |
|  | **Skill/s Assessed** | …Ability to write an introduction with a thesis  ...Ability to use textual evidence to support argument  ...Ability to write quickly, brainstorming about an initial opinion  …Ability to correctly cite sources | | |
|  | **Criteria for Success** | Rough draft includes an introduction with a thesis and evidence to support argument | | |
|  |  | **Instructional Strategies** (flexible, depending on student need) | * Workshop on introductions with thesis statements * Analysis of pro and con sides of debate * Quick write on initial opinion * Analysis of persuasive elements of Citizens Environmental Coalition website * Workshop (small-group) on persuasion using resources from <http://www.hhs.helena.k12.mt.us/Teacherlinks/Oconnorj/persuasion.html> | |
| **Mini-task** | Individual | Revise your rough draft and write a final draft of your Op-Ed. | | |
|  | **Skill/s Assessed** | ...Ability to revise and edit for spelling, grammar, usage, format, and clarity errors | | |
|  | **Criteria for Success** | Final draft is almost error free | | |
|  |  | **Instructional Strategies** (flexible, depending on student need) | * Peer revision/ editing, looking at spelling, grammar, usage, and format | |
| **Mini-task** | Group | Complete your public service campaign and deliver it to an authentic audience. | | |
|  | **Skill/s Assessed** | … Ability to choose and communicate to an authentic audience  …Ability to describe how a nuclear reactor works, including the waste it generates  ...Ability to use textual evidence to support argument | | |
|  | **Criteria for Success** | Public service campaign includes a clear position with appropriate evidence and is directed at an authentic audience | | |
|  |  | **Instructional Strategies** (flexible, based on student needs) | * Analyze models of other public service campaigns * Analysis of Citizens Environmental Coalition website * Evaluation according to project rubric * Workshop (small-group) on persuasion using resources from <http://www.hhs.helena.k12.mt.us/Teacherlinks/Oconnorj/persuasion.html> | |
| **Mini-task** | Group | Complete a group folder (a collection in Google Docs), that includes your group contract, task list, and notes from group meetings. | | |
|  | **Skill/s Assessed** | ...Ability to use various strategies to delegate and divide tasks among group members and check for completion  …Ability to complete tasks in a timely fashion according to pacing chart  …Ability to communicate effectively with team | | |
|  | **Criteria for Success** | Group contract includes series of steps to use in order to hold group members accountable, with evidence of use of steps in notes. Task list divides tasks fairly and includes notes on completion and timeliness | | |
|  |  | **Instructional Strategies** (flexible, depending on student need) | | * Team-building sessions * Pacing chart with list of benchmarks * Peer-collaboration assessments using collaboration rubric * Group meetings with teacher to review contract and notes * Group role divisions, with one member tasked with maintaining group folder * Structured, teacher provided task lists for struggling groups |

# Section 4: What Results?

Student work samples